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## United States Department of Agriculture.

### BUREAU OF PLANT INDUSTRY,

New and Rare Seed Distribution.

WASHINGTON, D. C.

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## ALFALFA.

Instructions adapted to Pennsylvania, West Virginia, northwestern Maryland, and northern New Jersey.

**OBJECT OF THE DISTRIBUTION.**—The distribution of new and rare seeds has for its object the dissemination of new and rare crops, improved strains of staple crops, and high-grade seed of crops new to sections where the data of the department indicate such crops to be of considerable promise. Each package contains a sufficient quantity for a preliminary trial, and where it is at all practicable the recipient is urged to use the seed for the production of stocks for future plantings. It is believed that if this practice is followed consistently it will result in a material improvement in the crops of the country. Please make a full report on the inclosed blank regarding the results you obtain with the seed.

### DESCRIPTION.

Alfalfa (*Medicago sativa*) is a deep-rooted, hardy, perennial forage plant, belonging to the family which includes beans, peas, and clover. It occupies the same place in western agriculture that clover fills in the northeastern part of the United States. In chemical composition it resembles the clovers, peas, and allied legumes in having a high protein content, but it slightly outranks any of these that are now under cultivation in both total and digestible protein and yields a greater tonnage per season. Since it is perennial, it will last a number of years unless crowded out by weeds or otherwise destroyed.

### SOIL REQUIREMENTS.

A deep, fertile, well-drained, nonacid soil, reasonably free from weeds is required. The most favorable soil is a loam or sandy loam with a porous subsoil, but the greater part of the alfalfa in this region is being grown on types of much heavier texture. It is practically useless to sow alfalfa on thin soils where the bedrock approaches the surface, on land underlain with hardpan, or in locations where the subsoil is so compact that the roots can not penetrate to considerable depths. It is also equally useless to attempt to grow alfalfa on land where the water table comes near the surface. For the purpose of ascertaining the character of the soil and subsoil and also the depth to the water table, frequent borings should be made with a soil auger. In determining the adaptability of a tract of land to alfalfa, this auger will generally be of more assistance than a chemical analysis.

Not only should the land have good underdrainage, but the surface also should have sufficient slope to carry off the surplus water readily. Well-drained river or creek bottom lands which are subject to occasional overflow are well adapted to alfalfa, provided the overflows are not of long duration.

Limestone soils are in general particularly well suited to alfalfa, but even such lands are frequently acid and require liming in order that this crop may be grown successfully.



**PRECEDING CROP.**

When once started under favorable soil conditions, weeds will likely prove the most dangerous enemy. For this reason it is best to precede alfalfa for one or two years with crops, like corn or potatoes, which permit of clean cultivation. Alfalfa may also follow wheat, oats, or barley to good advantage, provided the land has previously been treated in such a way as to destroy the weeds.

**PREPARATION OF THE SEED BED.**

If possible, at least six weeks should intervene between the time of plowing and that of sowing. Frequent harrowing should be given to settle the ground, produce the necessary fine tilth, and destroy the weed seedlings as they start. Where conditions permit, the land should be plowed deep in the fall, leaving it in the rough furrow over winter. The following spring it should be disked and then harrowed at frequent intervals until sowing time. Where it is desired to have the alfalfa immediately follow a small-grain crop, the soil should be deeply and thoroughly prepared before sowing to grain, and after this crop is removed the land should be disked thoroughly and harrowed frequently until sown. It is seldom safe to plow such land, as there is not sufficient time for the seed bed to become thoroughly settled before the seed should be sown.

**LIMING.**

Practically all the soils in the region under consideration are benefited by applications of lime. It may be applied with a manure spreader, a fertilizer distributor, a lime distributor, or by hand. Any method which spreads the lime uniformly and at low cost is satisfactory. It should be applied at least two or three weeks before the seed is to be sown, in order that it may become thoroughly incorporated with the soil. At least a ton of burned lime is generally required, and larger applications are often necessary on the heavier soils. If ground limestone or ground oyster shell is used, the quantity should be double that of the burned lime. Experiments have shown very little difference in the final results obtained from the different forms of lime. Burned lime will give quicker results, but the ground limestone and ground oyster shell will finally give the same benefit. The essential element in lime in any form is the calcium oxid, and it is recommended that the farmer use whichever form of lime is cheapest, based upon the percentage of this element present. Where the consumer pays the freight, it should be remembered that he will not only have to pay such charges on practically twice as much of the ground limestone as of the burned lime, but will also be to the additional expense of hauling and spreading 2 tons of the former to 1 of the latter in order to obtain the same results.

**FERTILIZING.**

Well-rotted barnyard manure which is completely free from weeds is the most satisfactory fertilizer. It should be spread on the land before plowing, in order that it may become thoroughly incorporated with the soil. Good results also follow from heavy applications to the preceding crop. If the manure is not available, a liberal application of commercial fertilizers, rich in phosphoric acid, should be made. The percentage of nitrogen may be low, but some nitrogen should be supplied for the young plants before they become inoculated and are able to secure their supply from the air. On most clay soils heavy applications of potash have not been profitable. A combination which has been commonly recommended is muriate of potash, 75 to 100 pounds; acid phosphate, 350 to 500 pounds; and nitrate of soda, 50 to 75 pounds. The



cheapest and most satisfactory method by which the consumer may obtain such a combination is to purchase the desired ingredients and mix them in their proper proportions.

#### INOCULATION.

Nitrogen-fixing bacteria should be provided unless the soil is known to be naturally supplied with these germs. This may be best accomplished by scattering over the area to be sown soil from a field upon which the crop has previously been successfully grown. The soil should be broadcasted at the rate of from 250 to 500 pounds per acre and harrowed in as soon as practicable. Soil from the roots of sweet-clover plants also will inoculate alfalfa. Another method of inoculation which may be used is that of inoculating the seed with an artificial culture, a limited quantity of which can be procured from the United States Department of Agriculture free of charge. Full instructions for use accompany each bottle of culture. The combined use of soil and an artificial culture is recommended where both can be readily obtained.

#### SOWING.

The seed should be sown at the rate of 25 to 30 pounds per acre, the heavier sowing being preferable, as it makes a finer hay and helps to keep down the weeds. It may be drilled or broadcasted with a wheelbarrow seeder and covered lightly with a smoothing harrow or weeder. A much more even stand may usually be secured by dividing the seed and sowing one-half each way of the field. Experience has shown that drilling gives a higher percentage of germination, and this being the case a smaller quantity of seed per acre is required than where it is broadcasted.

A nurse crop is not recommended except where the alfalfa is sown in the early spring, when a light sowing of oats or barley (1 to 1½ bushels per acre) will help to keep down the weeds and, if it is cut for hay, may not seriously injure the alfalfa.

The most favorable time for sowing is from the latter part of June to the middle of August. In northern Pennsylvania the best results are obtained from sowing late in June or as soon thereafter as moisture conditions are favorable. In the southern part of the region the seed may with safety be sown as late as the middle of August. Successful stands are also sometimes secured from seedlings in late August and early September, but they are more subject to winter-killing and are not generally recommended.

#### TREATMENT OF THE STAND.

Late summer sowings will ordinarily require no further treatment until the following season, when three cuttings may be expected. The crop should be cut when the plants are pretty well in bloom or when the basal shoots have made a good start. In spring sowing, unless the weeds threaten to choke out the alfalfa, the crop should not be clipped until it is 12 to 15 inches high and in bloom. If the first cutting is light it may be left on the ground as a mulch, but if it is heavy enough to smother the alfalfa it should be removed. In all cases, cutting should cease sufficiently early to permit a 6-inch to 8-inch growth for winter protection. When the plants become yellow they should be cut and removed from the field. If the stand becomes very thin or patchy, the field should be plowed and reseeded. Attempts at patching up poor stands have not generally been successful. If the weeds threaten to destroy the alfalfa, cultivation immediately after cutting or early in the spring with the "alfalfa harrow," which is a modified form of the spring-tooth harrow, has sometimes given good results. It is quite well established that no implement which will



seriously bruise the crowns should be used to cultivate an alfalfa field. When the crowns are mutilated, disease may enter and reduce the stand. A top-dressing of well-rotted stable manure applied in the late fall or early winter will not only furnish plant food, but will also serve as a protection during the winter months. Where this is not available, an application of 300 to 500 pounds of acid phosphate per acre, with a small amount of potash, may be beneficial. Alfalfa makes good pasture for nearly all kinds of farm animals, but under no circumstances should it be pastured until it has become thoroughly established or when the ground is wet or frozen. It should not be pastured closely at any time, for the grazing down of the crowns will often result in its destruction. Owing to the difficulties encountered in procuring and maintaining a good stand in this section, it is very doubtful whether one can afford to take the chances of injuring a well-established field by pasturing it at all.

#### TWO LEADING COMMERCIAL VARIETIES OF ALFALFA.

*Common alfalfa.*—Under this head is included the greater part of the alfalfa grown in the United States, the seed from the various sources frequently being designated by the State in which it was produced. Where alfalfa has been grown under a certain set of conditions for a considerable time, there is a tendency, through elimination, to produce a different type, presumably best adapted to the conditions under which it was developed. Thus, for instance, seed from fields that have been grown for several seed generations in Montana and the Dakotas may be somewhat more hardy than that grown farther south. Likewise, seed grown under semiarid conditions without irrigation may be superior for dry-land farming. In sections where winterkilling is not a factor, the ordinary types are recommended in preference to the so-called hardy alfalfas, as they generally produce somewhat heavier yields. In purchasing seed of common alfalfa an effort should be made to procure it from approximately the same latitude as that in which it is to be sown.

*Grimm alfalfa.*—Grimm alfalfa was introduced into this country in 1857 from Baden, Germany, by Wendelin Grimm, of Carver County, Minn. Careful investigations indicate that it owes its superior hardiness to the fact that it is the result of a natural cross between the common variety and the yellow-flowered alfalfa (*Medicago falcata*) and that by virtue of its being exposed to numerous severe winters the weaker plants were eliminated, leaving only the hardy ones to perpetuate the strain. Grimm alfalfa does not differ materially in appearance from the ordinary strain, so that the casual observer has difficulty in distinguishing one from the other. While a large percentage of its flowers are of the same color as those of common alfalfa, there are some that represent many shades of violet, yellow, and other hues. The taproots show a tendency to branch, and the crowns are inclined to be low set and spreading, characteristics which undoubtedly are of great importance in rendering the variety resistant to drought. Grimm alfalfa is one of the hardest, if not the most hardy, of our commercial strains. It is recommended for sections where the winters are especially severe and where little protection is given by snow. In sections where winterkilling is not an important consideration it is not thought to be materially superior to common alfalfa.

#### PUBLICATIONS AVAILABLE.

For further details, see Farmers' Bulletins Nos. 757, Commercial varieties of Alfalfa; 1229, Utilization of Alfalfa; and 1283, How to Grow Alfalfa, which may be obtained free of charge upon application to the Secretary of Agriculture, Washington, D. C.

OCTOBER 30, 1923.